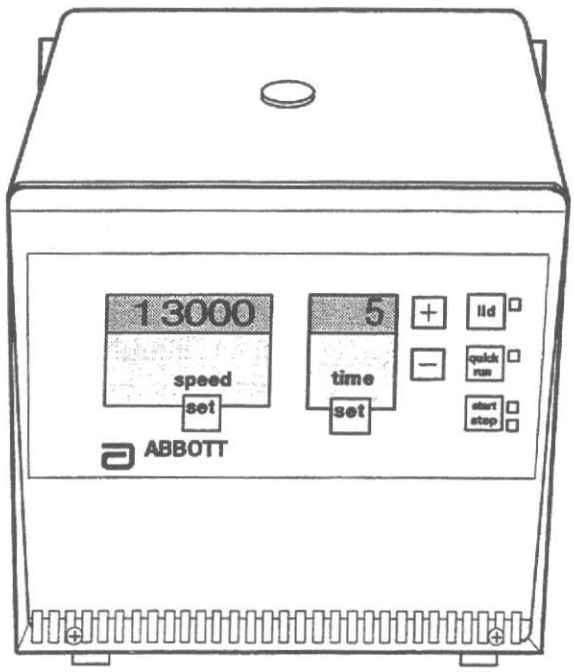
Centrifuge

Instruction Guide



Abbott Laboratories
Abbott Park, IL 60064

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Introduction

The X SYSTEMS® Centrifuge Instruction Guide provides installation, operation, maintenance and troubleshooting information for the Centrifuge. Information in this guide applies to centrifuges with digital timers.

For information concerning assays or assay requirements, please refer to the appropriate assay specific insert.

NOTE: In order to load LCx™ Amplification vials into the centrifuge rotor, plastic centrifuge adapters are required.

For additional assistance, please call the Customer Support Center at 1-800-527-1869 (USA).

System Features

The centrifuge is microprocessor-controlled and has a maintenance-free induction driven motor. The frame of the unit is made of solid steel construction with an integrated armor chamber and suspension for the drive and lid mechanics. The chamber is made of impact-resistant plastic and is mounted to the frame to reduce noise and vibration. The unit has digital displays for speed, time and operating conditions (LED's).

Special Messages

Throughout the text, icons and signal words appear where the nature of the information warrants special attention.

NOTE: This message is used to indicate important information.

WARNING: Potential Biohazard. The *biohazard* icon labels an activity or area where the operator may be exposed to infectious materials or substances.

WARNING: Electrical Shock Hazard. The *electrical* warning icon alerts the operator to the possibility of electric shock in the described activity or at the posted location. When located on the analyzer, this icon refers the operator to the manual for information about the hazard.

WARNING: The *general* warning icon identifies a physical, mechanical, or procedural situation where the user must be aware, alert, and cautious to prevent injury.

CAUTION: This message is used to indicate a potentially serious condition if instructions are not followed.

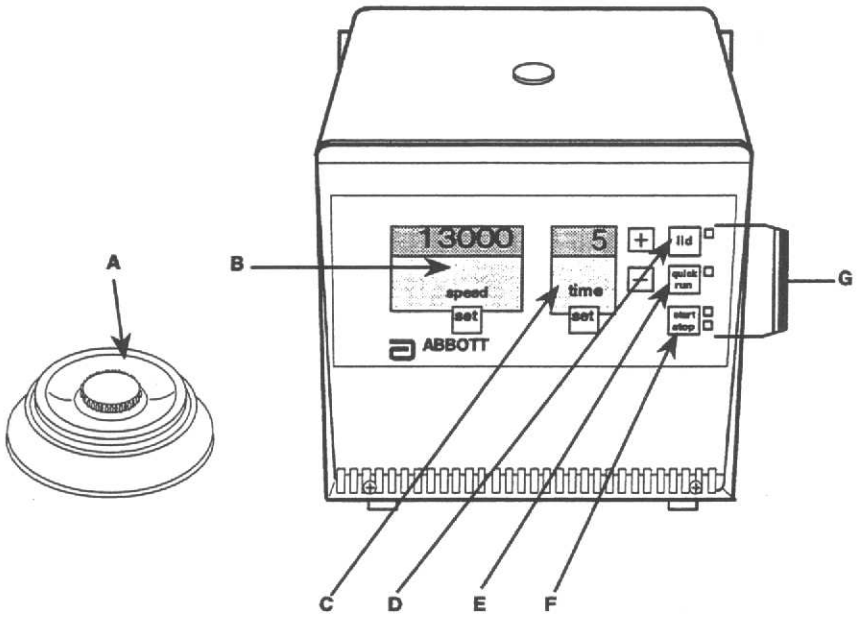
Be alert to the special meanings of these icons.

LCx is a trademark of Abbott Laboratories.

X SYSTEMS, TDx, TDxFLx and IMx are registered trademarks of Abbott Laboratories.

Centrifuge Components

This section illustrates and defines the components of the X SYSTEMS® Centrifuge:



A. Rotor with Cover
B. Speed/Set
C. Time/Set
D. Lid Key
E. Quick Run
F. Start/Stop
G. Indicator LED's

X SYSTEMS® Centrifuge Components
Figure 1

A. **Rotor with Cover**: A 24 position aluminum chamber surrounded by an impact-resistant plastic casing which reduces noise and vibration.

B. **Speed/Set**: During the acceleration and centrifugation phases, the set speed value of 13000 rpm is displayed. When the centrifuge brakes, "br" is displayed.

C. **Time/Set**: Displays time values. If a time is preselected, the last minute will be counted down in seconds. If "hd" is displayed, the unit has been programmed for continuous operation.

Centrifuge Components (continued)

D. **Lid Key**: The centrifuge has a safety lid interlock system. The lid can only be opened by pressing the "lid" key after the braking process is finished and the yellow LED is illuminated.

E. **Quick Run**: Centrifugation can also be started with the "quick run" key if the green LED is illuminated. As long as the key is pressed down, the rotor accelerates to its highest speed. Centrifugation continues until the key is released, at which point the rotor brakes quickly.

F. **Start/Stop**: When the green start LED is illuminated, centrifugation can be started by pressing the "start/stop" key. During the centrifugation run the red stop LED is illuminated.

G. **Indicator LED's**: Colored visual indicators that illuminate to indicate operating conditions.

Centrifuge Specifications

General Characteristics

- Capacity of centrifuge head = 24 tubes (1.5 mL)
- Relative centrifugal force = 13,400 g (minimum)
- Digital timer = 1–99 minutes or continuous operation
- Acceleration time = 30 seconds (full load at 120 V 60Hz)
- BTU/Hr output = less than or equal to 50

Physical Characteristics

- Centrifuge depth = 14.75″ (375 mm)
- Centrifuge width = 11.18″ (284 mm)
- Centrifuge height (closed lid) = 9.5″ (241 mm)
- Centrifuge height (opened lid) = 18.5″ (470 mm)
- Rotor Radius = 3.11″ (82.6 mm)
- Maximum weight = 38.00 lbs. (17.2 kg)

Electrical Characteristics

- Maximum current requirements = 2.5 amps
- Voltage = 100–120 VAC
- Frequency = 50/60 Hz
- Power connection = 3-prong grounded outlet (USA)
- Leakage current = less than 500 microamps

Environmental Requirements

- Room temperature = 15 to 35° C (59 to 95° F)
- Humidity = 15 to 85% humidity
- Location = flat, level surface

Precautions and Limitations

1. The X SYSTEMS® Centrifuge lid interlock system is intended to protect the user. Do not attempt to defeat the lid interlock system of the centrifuge or operate the centrifuge if the interlock system is not functioning.
2. When the centrifuge is not properly balanced, excessive noise and/or vibration can occur.
   - Stop the centrifuge run and determine the source of the noise or vibration (e.g., uneven number of tubes, unequal volume of liquid).
   - If any component of the centrifuge appears to be damaged, discontinue use and contact the Customer Support Center at 1-800-527-1869 (USA).
3. Abbott Laboratories cannot accept responsibility for the accuracy of any assay results produced by using centrifuge tubes which have been washed for reuse or are manufactured by anyone other than Abbott Laboratories. Use of any other centrifuge tubes may result in damage to the tubes or to the centrifuge itself.
4. The centrifuge and the centrifuge rotor should be cleaned as needed.

WARNING: Potential Biohazard. Handle all specimens, reagents and the centrifuge rotor as potentially infectious materials.

During cleaning, wear gloves, lab coat, and safety glasses, and follow other biosafety practices as specified in the OSHA Bloodborne Pathogen Rule (29 CFR 1910.1030) or other equivalent biosafety procedures.

Decontaminate using an EPA registered tuberculocidal disinfectant such as 2 % activated glutaraldehyde.

WARNING: Electrical Shock Hazard. Unplug the power cord before cleaning.

CAUTION: Never autoclave the rotor.

Do not use sodium hypochlorite (chlorine bleach) on the rotor, as this will cause pitting to the rotor surface.

Avoid using excessive amounts of liquid while cleaning the rotor chamber. This may cause damage from liquid seepage around the motor shaft.

Avoid the use of abrasive cleaners which could scratch the surface.

Unpacking

1. Carefully remove the X SYSTEMS® Centrifuge from the shipping carton.
2. Check the outside and the rotor of the centrifuge for damage. If damage is observed, keep the shipping carton and all packing material intact.
3. Contact the Customer Support Center at 1-800-527-1869 (USA) to report damage or missing centrifuge items.

Electrical Connection

Install the X SYSTEMS® Centrifuge using the following procedure:

1. Place the centrifuge on a flat surface near an appropriate AC outlet.
2. Make sure the voltage requirement imprinted on the identification label is equal to the available voltage.
3. Plug the power cord into the outlet.

Lid Opening

After the centrifuge power cord is plugged in, the lid may be opened. Press the "lid" key and lift the lid.

NOTE: In the event of a momentary loss of power, the microprocessor always performs a complete braking sequence (displaying "br"). This function assures that the lid cannot be opened as long as the rotor is turning.

Speed Display

The set speed value is preprogrammed and may be verified using a tachometer. Refer to the Speed Verification section for instructions.

Time Selection

For information concerning assays or assay requirements, please refer to the appropriate assay specific insert.

For TDx®, TDxFLx®, and IMx® assays which require a centrifugation time in less than full minute increments (30 seconds, 90 seconds, etc.), set the centrifuge time to the next full minute.

For LCx™ assays which require pulse centrifugation use the Quick Run feature.

For additional assistance, please call the Customer Support Center at 1-800-527-1869 (USA).

Programming Time

The centrifuge can be programmed to run from 1 to 99 minutes.

1. Press the "set" key of the time field. The time display will begin flashing.
2. The time setting can be changed in increments of a minute with the "+" or "–" keys.
3. Press the "set" key again to store the new value.

Continuous Operation

The centrifuge will run until manually stopped.

1. Press the "set" key of the time field. The time display will begin flashing.
2. Press the "–" key until "hd" is displayed.
3. Press the "set" key again to store.

Centrifuge Loading

⚠ **WARNING: Wear clean laboratory gloves while performing any centrifugation procedure.**

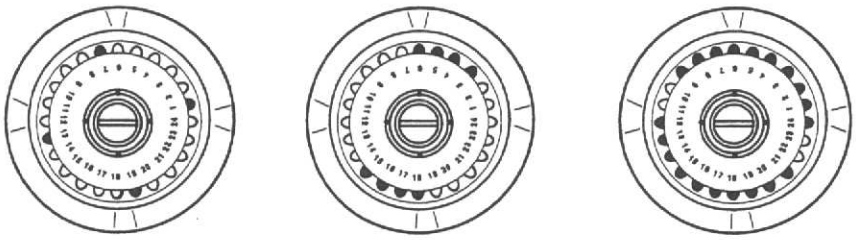
1. Use only Abbott Laboratories centrifuge tubes. Materials required for individual assays are described in the appropriate assay specific insert.

   NOTE: Use plastic centrifuge adapters for LCx™ Amplification vials.

2. Remove the rotor cover. Load the centrifuge rotor with an **even** number of the same size centrifuge tubes containing samples of the same volume.

   NOTE: If there is an uneven number of samples, fill an empty tube with water to the same volume as the sample and use as a balance tube.

3. If there is less than a full load, place identical samples 180° apart (see Figure 2).
4. Make sure that the caps are securely closed.
5. Snap on the rotor cover and close the centrifuge lid. If the lid is not properly locked ("open" displays), the centrifuge will not start. Press gently on the lid until it clicks.



Centrifuge Loading
Figure 2

Initiating Run

1. Program and load the centrifuge. Refer to the Time Selection and Centrifuge Loading sections for instructions.
2. Press the "start/stop" key.
3. The red stop LED illuminates.
4. The lid latch locks and the "lid" key is disabled.
5. The set speed and programmed time are displayed.
6. During operation, the time value counts down in minutes; the last minute counts down in seconds.
7. The centrifuge runs until the programmed time expires or the run is interrupted.

   NOTE: To interrupt a run, press the "start/stop" key.
8. The centrifuge motor shuts off.
9. The braking process begins and "br" displays.
10. The lid remains locked until the braking process is complete. The yellow lid LED illuminates.
11. Press the "lid" key and remove the samples.

Run Interruption

1. Press the "start/stop" key to stop the centrifuge run.

⚠ **CAUTION: Excessive noise and/or vibration may indicate that the rotor is not properly seated on the drive shaft, or that the centrifuge is not properly balanced. Stop the centrifuge run.**

2. The centrifuge motor shuts off.
3. The braking process begins and "br" displays.

   NOTE: The lid can only be unlocked when the braking process is finished and the yellow LED is illuminated.

4. When the yellow LED is illuminated, press the "lid" key and determine the source of the noise or vibration.

⚠ **CAUTION: If any component of the centrifuge appears to be damaged or if the centrifuge cannot be adjusted to perform properly, discontinue use and contact the Customer Support Center at 1-800-527-1869 (USA).**

5. Inspect the rotor for tube balance and adjust if necessary.
6. Verify that the rotor is correctly installed on the drive shaft. Refer to the Maintenance section for instructions on installing the centrifuge rotor.
7. The run may be continued once the problem is corrected and the necessary adjustments are made.

Standby

If the unit is not used for 2 minutes, the microprocessor will switch the entire digital display off avoiding unnecessary power consumption. This is indicated by a flashing point on the display. The display can be reactivated by pressing one of the keys.

Quick Run

Centrifugation can be activated if the green LED is illuminated. Quick run takes place when the "quick run" key is pressed continuously. As long as the key is pressed down, the rotor accelerates to its highest speed. Centrifugation continues until the key is released, at which point the rotor brakes quickly.

Cycle Counter

The centrifuge is equipped with a cycle counter. A cycle is defined as: acceleration, run at speed, and deceleration to rest, regardless of the run duration. The microprocessor automatically counts the cycles. The number of cycles may be checked at any time by pressing both of the "set" keys at the same time. The accumulated rotor cycles will be displayed.

Cleaning and Decontamination

TDx®, TDxFLx®, IMx® and LCx™ (Area 1) Assays

The X SYSTEMS® Centrifuge cleaning procedure should be performed on an as needed basis.

WARNING: Potential Biohazard. Handle all specimens, reagents and the centrifuge rotor as potentially infectious materials.

During cleaning, wear gloves, lab coat, and safety glasses, and follow other biosafety practices as specified in the OSHA Bloodborne Pathogen Rule (29 CFR 1910.1030) or other equivalent biosafety procedures.

Decontaminate using an EPA registered tuberculocidal disinfectant, such as 2% activated glutaraldehyde.

WARNING: Electrical Shock Hazard. Unplug the power cord before cleaning.

Removing the centrifuge rotor

The cleaning procedure requires the removal of the centrifuge rotor.

1. Press the "lid" key and open the lid.
2. **Unplug** the centrifuge from the AC outlet.
3. Using both hands, grasp the rotor on opposing sides and detach it from the drive shaft by pulling straight-up.

CAUTION: Always pull straight-up or the drive shaft may be damaged.

Cleaning the centrifuge rotor

1. Clean the plastic case aluminum rotor using a neutral cleaner (pH 6.5 to 7.5).
2. The rotor may be rinsed with distilled water and dried in a drying chamber at 50°C.
3. For infectious materials, wipe the rotor and the rotor cover using an EPA registered tuberculocidal disinfectant, such as 2% activated glutaraldehyde.

CAUTION: Never autoclave the rotor.

Do not use sodium hypochlorite (chlorine bleach) on the rotor, as this will cause pitting to the rotor surface.

Cleaning and Decontamination (continued)

Cleaning the rotor chamber

1. Clean the chamber with a damp cloth moistened with a non-corrosive liquid.

CAUTION: Avoid using excessive amounts of liquid while cleaning. This may cause damage from liquid seepage around the motor.

Avoid the use of abrasive cleaners, which could scratch the surfaces.

2. After cleaning, use a dry cloth to remove all moisture.

LCx™ Assays (Area 2)

The following Cleaning and Decontamination procedures should be performed on the centrifuge for LCx™ assays in Area 2 on a monthly schedule or on an as needed basis (i.e., amplification vial opening or breaking).

WARNING: Potential Biohazard. Handle all specimens, reagents and the centrifuge rotor as potentially infectious materials.

During cleaning, wear gloves, lab coat, and safety glasses, and follow other biosafety practices as specified in the OSHA Bloodborne Pathogen Rule (29 CFR 1910.1030) or other equivalent biosafety procedures.

Decontaminate using an EPA registered tuberculocidal disinfectant, such as 2% activated glutaraldehyde.

WARNING: Electrical Shock Hazard. Unplug the power cord before cleaning.

CAUTION: In case of accidental spills of amplification product, perform the following cleaning procedures:

Removing the centrifuge rotor

The cleaning procedure requires the removal of the centrifuge rotor.

1. Press the "lid" key and open the lid.
2. **Unplug** the centrifuge from the AC outlet.
3. Using both hands, grasp the rotor on opposing sides and detach it from the drive shaft by pulling straight-up.

CAUTION: Always pull straight-up or the drive shaft may be damaged.

Cleaning and Decontamination (continued)

Cleaning the centrifuge rotor

1. Clean the plastic case aluminum rotor and rotor cover using repeated applications of a neutral cleaner (pH 6.5 to 7.5) and rinse with distilled water. Use a dry cloth to remove all moisture.
2. For infectious materials wipe the rotor and the rotor cover using an EPA registered tuberculocidal disinfectant, such as 2% activated glutaraldehyde.

⚠ **CAUTION: Never autoclave the rotor.**

Do not use sodium hypochlorite (chlorine bleach) on the rotor, as this will cause pitting to the rotor surface.

Cleaning the rotor chamber

1. Clean the chamber with a damp cloth moistened with a non-corrosive liquid.
2. For infectious materials and to reduce the risk of amplification product contamination, wipe the rotor chamber with a tissue moistened with 1% sodium hypochlorite solution (20% chlorine bleach).
3. Wipe the rotor chamber with a tissue moistened with 70% ethanol. Repeat applications of 70% ethanol until the chlorine residue is no longer visible.

⚠ **CAUTION: 70% ethanol is flammable. Avoid use on warm and/or heated surfaces.**

NOTE: Chlorine solutions may pit equipment and metal surfaces. Use sufficient amounts or repeated applications of 70% ethanol until the chlorine residue is no longer visible.

⚠ **CAUTION: Avoid using excessive amounts of liquid while cleaning. This may cause damage from liquid seepage around the motor.**

Avoid the use of abrasive cleaners, which could scratch the surfaces.

Cleaning the centrifuge surface

1. Wipe the outside of the centrifuge with a tissue moistened with 1% sodium hypochlorite solution (20% chlorine bleach).
2. Wipe the outside of the centrifuge with a tissue moistened with 70% ethanol. Repeat applications of 70% ethanol until the chlorine residue is no longer visible.

⚠ **CAUTION: 70% ethanol is flammable. Avoid use on warm and/or heated surfaces.**

NOTE: Chlorine solutions may pit equipment and metal surfaces. Use sufficient amounts or repeated applications of 70% ethanol until the chlorine residue is no longer visible.

Cleaning and Decontamination (continued)

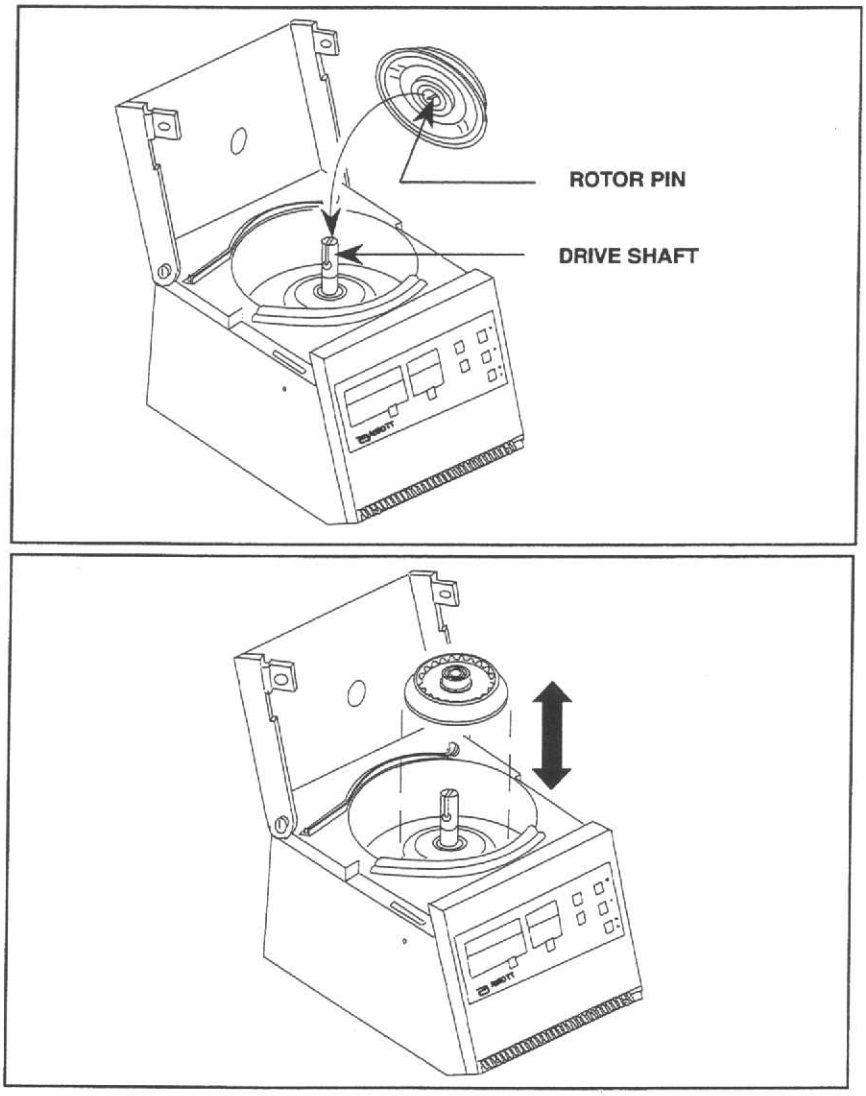
Cleaning the plastic centrifuge adapters

1. Remove the centrifuge adapters from the centrifuge rotor.
2. Soak the adapters in 1% sodium hypochlorite solution (20% chlorine bleach) for a minimum of five minutes.
3. Rinse thoroughly with distilled water and dry.

Rotor Insertion

⚠ **CAUTION: Improper insertion of the rotor may cause damage to the rotor and drive shaft. Be sure to follow the instructions exactly.**

Before installing the rotor, make sure that the rotor chamber is free of contamination (dust, etc.). Remove the rotor cover by pulling straight up. Lubricate entire drive shaft with grease (LN 9518-14). Using both hands, align the rotor pin over the drive shaft slot.

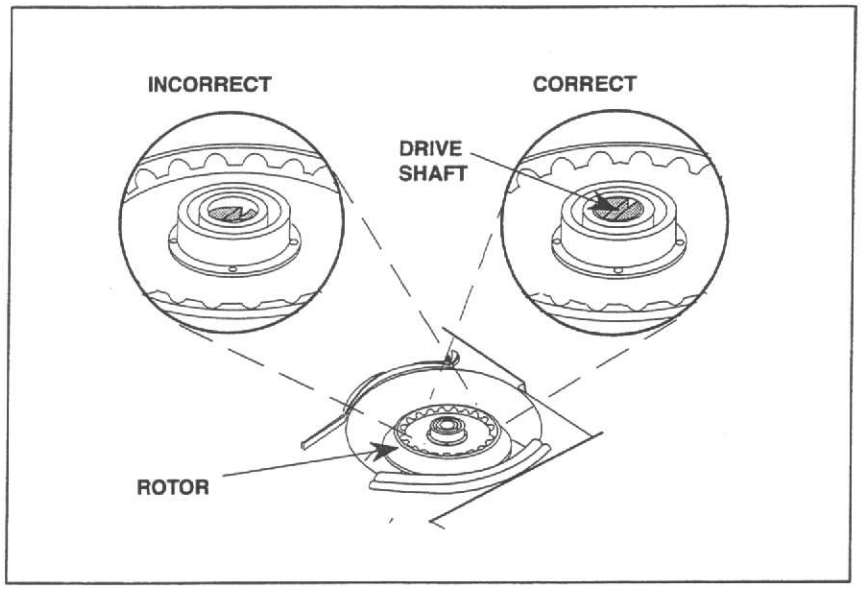


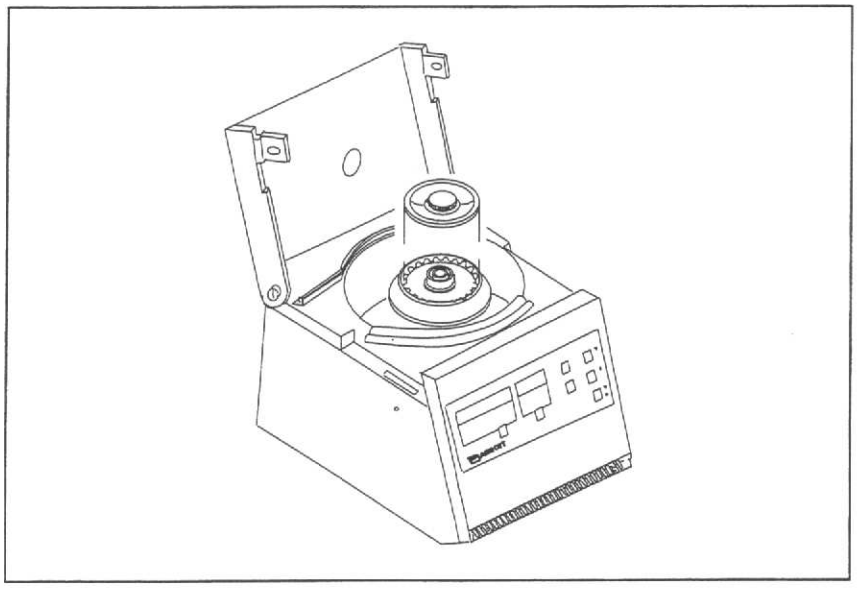
Rotor Installation
Figure 3

Cleaning and Decontamination (continued)

Rotor Insertion (continued)

Press the rotor down until it is seated into the carrier slot. Before replacing the rotor cover, verify that the rotor is flush with the drive shaft. Snap on the rotor cover. Plug in the centrifuge.





Rotor Installation
Figure 3.1

Error Codes

⚠ **CAUTION: Only qualified personnel may perform repairs on the centrifuge. Contact the Abbott Customer Support Center at 1-800-527-1869 (USA) for service.**

Displayed

Lid

Lid open during run.

- Wait until the rotor stops; disconnect the power supply.
- Reconnect the power supply and check the lid function.
- If the problem persists, call the Customer Support Center.

E01 or E12

NV-RAM defect.

- Call the Customer Support Center.

E03

Overheated motor or brake defect. The centrifuge motor may overheat due to repeated use.

- Let the centrifuge cool for 30 minutes.
- If the error code still appears there is a problem with the braking system.
- Call the Customer Support Center.

Observed

No Display

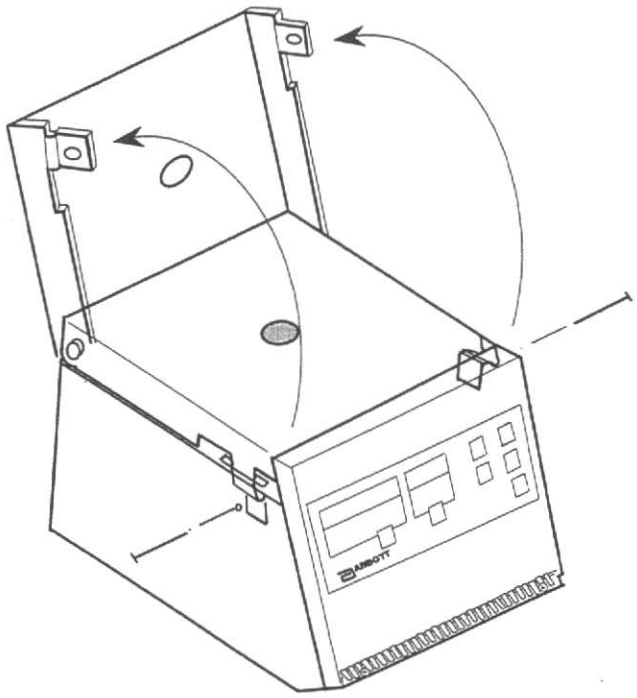
Power Failure.

- Check the power supply.
- If the power supply is working, the fuse in the centrifuge has blown or there is an electrical malfunction.
- Call the Customer Support Center.

Emergency Lid Release

Disconnect the power cord prior to using the emergency lid opening procedure. To unlock the electrically-locked lid, in case of power failure or defect, push a cylindrical pin into the holes located on each side of the panel (see Figure 4).

⚠ **CAUTION: Never open the lid manually while the rotor is still running.**



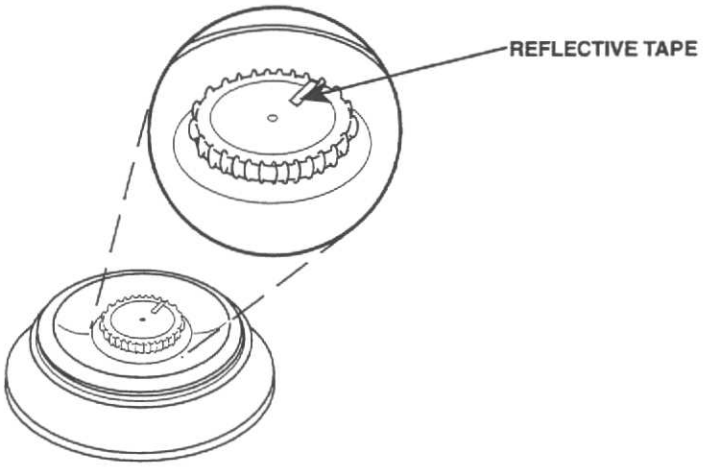
Emergency Lid Opening
Figure 4

Speed Verification Procedure

Calibrated photoelectric centrifuge tachometer:

- Abbott recommends the Shimpo DT-205 tachometer marketed by Shimpo America Corp., 3150 Devon Ave., Lincolnwood, IL 60659.
- Although the Shimpo tachometer is recommended, any optical unit which provides consistent readings may be used. The instructions provided with the tachometer should be followed in taking measurements.
- Do not use a tachometer which requires physically touching the rotating centrifuge head.

1. Fill 24 centrifuge tubes with 1.5 mL water.
2. Snap the caps on securely and load the 24 centrifuge tubes into the rotor.
3. Place reflective tape on the top edge of the rotor cover where it can be easily detected by the tachometer (see Figure 5). Close the lid.



Reflective Tape Area
Figure 5

Speed Verification Procedure (continued)

4. Set the time field to Continuous Operation (displaying "hd"). Refer to the Time Selection section for instructions.
5. Press the "start/stop" key.
6. Let the centrifuge run for 30 seconds before checking the speed.
7. Following the instructions supplied with the tachometer, aim the light beam of the tachometer directly through the lid window to take readings.
8. The set speed will be 13000 rpm ± 5%.

   NOTE: Do not attempt to adjust the centrifuge set speed. If you have any questions, contact the Customer Support Center at 1-800-527-1869 (USA).

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